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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,381	10/01/2003	Norio Hasegawa	501.39055CX1	4390

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EXAMINER

MOHAMEDULLA, SALEHA R

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 01/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/674,381

Applicant(s)

HASEGAWA ET AL.

Examiner

Saleha R. Mohamedulla

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 01 October 2003.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-37 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 100103.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

Claims 1-37 are pending.

### *Specification*

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over US# 6,192,100 to Acosta et al. in view of US# 5,637,425 to Lee et al.

Acosta teaches x-ray exposure methods and masks. X-ray wavelength overlaps the wavelength region of far ultraviolet light. Therefore, Acosta teaches far ultraviolet exposure light at least 100nm but less than 200 nm. Acosta teaches that optical lithography is a projection printing technique. In optical lithography, the mask is located some distance from the wafer to be exposed and a four or five times reduction between the mask image and the wafer image may be involved (col. 1, lines 30-35). In Figure 1, on the face of the mask, there is an absorber pattern 9 of X-ray opaque material of for example Au, W, or TaSi. The absorber

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pattern is transferred via x-rays onto a x-ray resist 3, which is on a device wafer 4 (col. 3, lines 35-40). As shown in Figure 1, the exposure light irradiates from the back surface of the mask having a front surface where the front surface has the absorber pattern. Therefore, Acosta teaches transferring a light shielding mask pattern image to a resist coated semiconductor wafer by reduction printing.

Acosta also teaches that the mask comprises a light screening metal region where a pellicle covering the integrated circuit pattern is contact-fixed to the metal region. In Figure 2, Acosta discloses a membrane 11 which protects the absorber pattern 9 from wear and contamination. This membrane is therefore a pellicle. The membrane 11 is supported by and given rigidity through, a spacer member 12 (col. 3, lines 47-55). The spacer member 12 can be of any material that can impart the desired rigidity and can withstand the processing temperatures likely to be encountered. Acosta teaches the use of boron doped silicon for the spacer 12 (col. 4, lines 21-23). Figure 4 shows the spacer member attached to the periphery of the mask. Therefore, Acosta teaches the use of metal for the spacer member and teaches the light screening metal region. The spacer member 12 should be in a shape similar to a washer that does not extend into an open region 13 through which the energy through the absorber pattern 9 of the X-ray mask is to pass (col. 4, lines 1-5). Therefore, and as shown in Figure 2, the spacer member is in the peripheral portion of the mask. Acosta teaches that the peripheral region of the mask is held by a holding mechanism. Figures 3 and 4 show that the mask substrate 6 is held by a member configuration 7. The pellicle membrane is a protective film that covers the integrated circuit pattern region. Therefore, Acosta teaches the protective film limitation of claim 35.

Acosta does not teach that the integrated circuit pattern on the mask comprises a photoresist pattern that is not provided in the peripheral region and a halftone phase shifting pattern.

Lee teaches a Levenson type phase shift mask comprising a resist pattern. The phase shift mask employs an inorganic resist as a screen. In this regard, the inorganic resist contains germanium and selenium and when the resist is diffused with silver, the mask has reduced transmittance (col. 2, lines 55-60). Therefore, the mask pattern is a halftone pattern. Lee teaches that an organic polymer 102, such as PMMA is used as a phase shifter film over a substrate. The Ge-Se inorganic resist is formed on the organic polymer layer (col. 3, lines 1-10). Figure 3D shows the silver-doped inorganic resist 104a. The remaining resist 104b is removed. A selective radiation then removes the exposed regions of the organic polymer 102, allowing predetermined surfaces of the substrate 100 to be exposed (col. 3, lines 29-32). Figure 3G shows the completed mask. The phase shift mask comprises a plurality of regularly spaced-apart screens, each consisting of silver-doped inorganic resist 104-a, on a shifter of organic polymer 102 atop the substrate 100 (col. 3, lines 35-40). Figure 4 shows that the mask may be irradiated from the front or back surface. Therefore, Lee teaches a mask with phase shifting and photoresist mask patterns. As shown in the figures, the photoresist pattern is not provided in the periphery of the mask. Lee intends the silver-doped resist pattern to be used to imprint a pattern into the wafer and therefore, the photoresist pattern of Lee would not be provided in the periphery of the mask.

The references are analogous art as they are drawn to optical semiconductor wafer exposure methods using masks. It would have been obvious to one of ordinary skill in the art to

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use the phase shifting and light shielding photoresist mask pattern of Lee as the mask of Acosta as Lee teaches that sharper screen and shift profiles, and therefore, sharper resolved features, can be obtained (col. 3, lines 55-60).

#### ***Double Patenting***

4. Claims 1-37 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 6,677,107 to Hasegawa et al. Although the conflicting claims are not identical, they are not patentably distinct from each other because the patent claims encompass the application claims.

#### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Saleha Mohamedulla whose telephone number is (571) 272-1387. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Saleha R. Mohamedulla

Patent Examiner

Technology Center 1700

January 17, 2005